OPERATION INDICATIVE BACKGROUND NOISE IN A DIGITAL RECEIVER

The present invention pertains to digital receivers and more specifically to digital receivers that do not supply an audible indication of the status of the receiver.

BACKGROUND OF THE INVENTION

In digital receivers, received RF signals are converted to extract a digital signal which is supplied to a vocoder portion of the receiver to supply an audio output dependent upon the received input signal. During periods when either a very weak or no RF signal is received there is no audio output from the receiver. This lack of output creates a very poor ambience for the operator, since the operator does not know if the receiver has malfunctioned, no signal is being sent, or there is no audio being sent.

Some manufacturers have attempted to solve this problem by supplying a light on the control panel of the receiver which provides a limited indication of the operation or system acquisition of the receiver. One of the problems with this solution is that the operator must continually watch the control panel. This is not a practical solution, especially when the operator may be doing some other function while operating the receiver.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide new and improved digital receivers in which operator ambience is greatly improved.

It is a further object of the present invention to provide digital receivers which include audible indications of the operation of the receiver.

It is a further object of the present invention to provide a method of improving the operator ambience of digital receivers.

It is still a further object of the present invention to provide a method of improving the operation of a digital radio which has a directional antenna or receives signals with different propagation paths.

These and other objects are realized by apparatus in a digital receiver for providing operation indicative background noise including a digital receiver with an RF portion, a digital portion and an audio portion, and a background noise generator having a background noise output coupled to one of the digital and the audio portions to provide background noise indicative of the operation of the receiver. One purpose is to make digital receivers sound more like the receivers with which operators are presently familiar.

These and other objects are further realized in a method of improving operator ambience in a digital receiver including the steps of providing a digital receiver with an RF portion, a digital portion and an audio portion, generating a background noise signal and supplying the generated background noise signal to the audio portion of the receiver.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the drawings:

FIG. 1 is a view in perspective illustrating receivers in different orientations relative to a transmitter;

FIG. 2 is a simplified block diagram of a digital receiver embodying the present invention;

FIG. 3 is a simplified block diagram of another embodiment of a digital receiver constructed in accordance with the present invention; and

FIG. 4 is a simplified block diagram of another embodiment of a digital receiver, similar to FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring specifically to FIG. 1, two digital receivers 10 and 12, having directional antennas, are illustrated in different orientations relative to a transmitter 15. Receiver 10 has an antenna 16 with a generally hemispherical receiving pattern 17 which, in FIG. 1, is oriented generally horizontally for maximum reception from transmitter 15. Receiver 12 has an antenna 18, similar to antenna 16 on receiver 10, but receiver 12 is rotated relative to transmitter 15 so that reception is greatly reduced. Digital receivers are primarily used in pagers, remote "wireless" telephones, terrestrial cellular phones and cellular phones for satellite based systems. Digital receivers can be used in any receiver used to receive audio information. It will of course be understood that digital receivers contain circuitry for converting the received analog RF signal to a digital signal and digital filtering which, by its nature, contains no background noise as is present in standard AM and FM receivers. Thus, loss of the received signal results in no audio output from the receiver. In some instances the rotation, or orientation, of receiver 12 may become so pronounced that reception of transmitted signals is lost completely, or is so low that they do not meet the receivers lower threshold. In such instances the receiver appears to be inoperative, since no indication of its correct operation is present.

The directional antennas 16 and 18 of FIG. 1 are simply one example of reasons for fading or loss of signals in receivers. Other examples can be moving out of a skip pattern, moving behind obstructions, losing a preferred path in a multipath system, a satellite passing overhead, etc. When receivers 10 and 12 are digital receivers and fading or loss of signal exceeds the lower reception threshold the audio output of the receivers drops to zero. In such instances the operator can not tell if the transmission stopped, the operator's receiver stopped working, the message ended, the receiver antenna needs re-orientation, etc. In the instance of the mis-oriented receiver antenna (receiver 12 in FIG. 1) the operator would not know that the receiver antenna is mis-oriented or how to orient it so as to properly receive the transmitted signal. Even if an operating light is supplied on the control panel of receiver 12, the operator is only aware that receiver 12 is operating and has no indication that some re-orientation is required. For example, in some current cellular phones a light will come on indicating that the phone is in a usable service area but doesn't indicate the available margin. Thus, the phone may be next to the cellular repeater or just barely inside its range for a given antenna orientation.

Referring specifically to FIG. 2, a simplified block diagram of a digital receiver 20 embodying the present invention is illustrated. Receiver 20 includes an antenna 21, an RF portion 23, a digital portion including vocoder 27, and an audio portion, including audio amplifiers 29 and final audio stage 31. Final audio stage 31 supplies signals to a transducer 33 which is a speaker, earphone, audio synthesizer or the like, for producing audible sounds.